

# IBM System z9 – April 27<sup>th</sup> 2006 announcement

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IBM Systems

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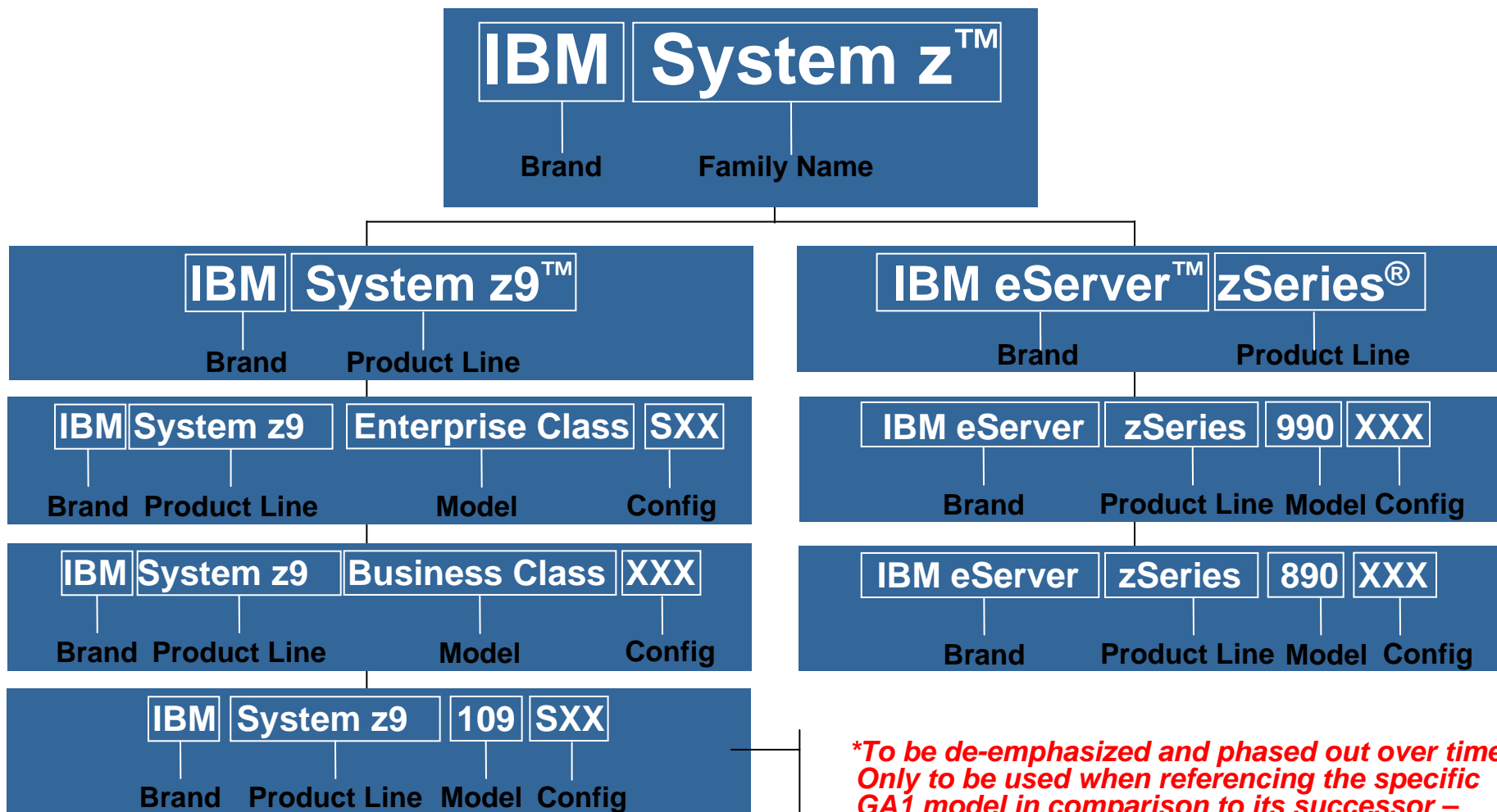
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# IBM System z9 Business Class Agenda

- **IBM System z™ Overview**
- **Introduction**
- **Operating System Support**
- **Processor and Memory**
- **I/O Connectivity**
- **Cryptography**
- **Availability**
- **Hardware Management Console**
- **Environmentals**
- **Server Time Protocol (Preview)**
- **Parallel Sysplex® and GDPS®**

## IBM System z naming – Quick Reference



*\*To be de-emphasized and phased out over time. Only to be used when referencing the specific GA1 model in comparison to its successor – the IBM System z9 Enterprise Class.*

# IBM System z family

## IBM eServer zSeries 990 z990 (2084)



- Announced 5/03 – first zSeries Superscalar Server with up to 48 PUs
- 4 models – Up to 32-way
- Specialty Engines
  - ▶ CP, IFL, ICF, zAAP
- On Demand Capabilities
  - ▶ CUoD, CIU, CBU, On/Off CoD
- Memory – up to 256 GB
- Channels
  - ▶ Four LCSSs
  - ▶ Up to 1024 ESCON® channels
  - ▶ Up to 240 FICON Express2 channels
  - ▶ Token-Ring, GbE, 1000BASE-T Ethernet
  - ▶ Coupling Links
- Crypto Express2
- Parallel Sysplex clustering
- HiperSockets™ – up to 16
- Up to 30 logical partitions
- Operating Systems
  - ▶ z/OS, z/VM®, VSE/ESA™, z/VSE™, TPF, z/TPF, Linux® on zSeries

## IBM eServer zSeries 890 z890 (2086)



- Announced 4/04 – zSeries Superscalar Server with 5 PUs
- 1 model – Up to 4-way
  - ▶ 28 capacity settings
- Specialty Engines
  - ▶ CP, IFL, ICF, zAAP
- On Demand Capabilities
  - ▶ CUoD, CIU, CBU, On/Off CoD
- Memory – up to 32 GB
- Channel
  - ▶ Two LCSSs
  - ▶ Up to 420 ESCON channels
  - ▶ Up to 80 FICON Express2 channels
  - ▶ Networking Adapters (OSA)
  - ▶ Coupling Links
- Crypto Express2
- Parallel Sysplex clustering
- HiperSockets – up to 16
- Up to 30 logical partitions
- Operating Systems
  - ▶ z/OS, z/OS.e, z/VM, VSE/ESA, z/VSE, TPF, z/TPF, Linux on zSeries

## IBM System z9 (z9 EC) (2094)



- Announced 7/05 - Superscalar Server with up to 64 PUs
- 5 models – Up to 54-way
- Granular Offerings for up to 8 CPs
- Specialty Engines
  - ▶ CP, IFL, ICF, zAAP, zIIP
- On Demand Capabilities
  - ▶ CUoD, CIU, CBU, On/Off CoD
- Memory – up to 512 GB
- Channels
  - ▶ Four LCSSs
  - ▶ Multiple Subchannel Sets
  - ▶ MIDAW facility
  - ▶ 63.75 subchannels
  - ▶ Up to 1024 ESCON channels
  - ▶ Up to 336 FICON channels
  - ▶ Enhanced FICON Express2 and 4
  - ▶ 10 GbE, GbE, 1000BASE-T
  - ▶ Coupling Links
- Configurable Crypto Express2
- Parallel Sysplex clustering
- HiperSockets – up to 16
- Up to 60 logical partitions
- Enhanced Availability
- Operating Systems
  - ▶ z/OS, z/VM, VSE/ESA, z/VSE, TPF, z/TPF, Linux on System z9

## IBM System z9 (z9 BC) (2096)



- Announced 4/06 - Superscalar Server with 8 PUs
- 2 models – Up to 4-way
- High levels of Granularity available
  - ▶ 73 Capacity Indicators
- Specialty Engines
  - ▶ CP, IFL, ICF, zAAP, zIIP
- On Demand Capabilities
  - ▶ CUoD, CIU, CBU, On/Off CoD
- Memory – up to 64 GB
- Channels
  - ▶ Two LCSSs
  - ▶ Multiple Subchannel Sets
  - ▶ MIDAW facility
  - ▶ 63.75 subchannels
  - ▶ Up to 420 ESCON channels
  - ▶ Up to 112 FICON channels
  - ▶ Enhanced FICON Express2 4 Gbps
  - ▶ 10 GbE, GbE, 1000BASE-T
  - ▶ Coupling Links
- Configurable Crypto Express2
- Parallel Sysplex clustering
- HiperSockets – up to 16
- Up to 30 logical partitions
- Enhanced Availability
- Operating Systems
  - ▶ z/OS, z/OS.ez/VM, VSE/ESA, z/VSE, TPF, z/TPF, Linux on System z9

# System z9 Operating System Support

Operating System	ESA/390 (31-bit)	z/Architecture (64-bit)
z/OS.e# Version 1 Release 4*, 5*, 6, 7, 8	No	Yes
z/OS Version 1 Release 4*, 5*, 6, 7, 8	No	Yes
Linux, 64-bit distribution	No	Yes
Linux, 31-bit distribution	Yes	No
z/VM Version 5 Release 1, 2	No	Yes
z/VM Version 4 Release 4**	Yes	Yes
z/VSE*** 3.1, VSE/ESA 2.7****	Yes	No
z/VSE V4***** (Preview – no GA announced)	No	Yes
z/TPF Version 1	No	Yes
TPF Version 4 Release 1 (ESA mode only)	Yes	No

# z/OS.e - z800, z890 and z9 BC only

\* Support for z/OS V1.4 and 1.5 will end March 31, 2007

\*\* Support for z/VM V 4.4 will end September 30, 2006

\*\*\* z/VSE V3 can execute in 31-bit mode only. It does not implement z/Architecture and specifically does not implement 64-bit mode capabilities. z/VSE V3 is designed to exploit select features of IBM System z hardware.

\*\*\*\* Support for VSE 2.7 will end February 28, 2007

\*\*\*\*\* z/VSE V4 is designed to exploit 64 bit real memory addressing, but will not support 64-bit virtual memory addressing

Note: Please refer to the latest PSP bucket for latest PTFs for new functions/features.

# System z9 z/OS and z/OS.e Support Summary



		z800 (WDFM)	z900	z890	z990	z9 EC	z9 BC	End of Service	Coexists with z/OS	Ship Date
z/OS & z/OS.e	1.4	x	x	x	x	x	x	3/07	1.7	9/02
	1.5	x	x	x	x	x	x	3/07	1.8*	3/04
	1.6	x	x	x	x	x	x	9/07	1.8*	9/04
	1.7	x	x	x	x	x	x	9/08*	1.9*	9/05
	1.8*	x	x	x	x	x	x	9/09*	1.10*	9/06*

z/OS.e - z800, z890 and z9 BC only

z/OS 1.4, 1.5 and 1.6 are no longer orderable.

z/OS 1.4 exploitation feature remains orderable until December 2006

**Only service-supported releases can coexist in the same sysplex**

\* Planned. All statements regarding IBM future direction and intent are subject to change or withdrawal without notice, and represents goals and objectives only.

# System z9 z/VM & VSE/ESA Support Summary



		z800 (WDFM)	z900	z890	z990	z9 EC	z9 BC	End of Market	End of Service	Ship Date
VSE/ESA	2.7	x	x	x	x	x	x	9/05	2/07	3/03
z/VSE***	3.1*	x	x	x	x	x	x	TBD	TBD	3/05
	4.1**	x	x	x	x	x	x	TBD	TBD	TBD
z/VM	4.4	x	x	x	x	x	x	3/06	9/06**	8/03
	5.1*	x	x	x	x	x	x	9/06**	9/07**	9/04
	5.2*	x	x	x	x	x	x	TBD	4/09**	12/05

\*Releases currently orderable

\*\*Planned

\*\*\*z/VSE V3 can execute in 31-bit mode only. It does not implement z/Architecture, and specifically does not implement 64-bit mode capabilities. z/VSE V3 is designed to exploit select features of IBM System z9 and zSeries hardware.

Note: z/VSE V4 is designed to exploit 64-bit real memory addressing, but will not support 64-bit virtual memory addressing



# System z Linux Support



	z800 (WDFM)	z900	z890	z990	z9 EC	z9 BC	Ship Date
SLES9	x	x	x	x	x	x	08/2004
RHEL4	x	x	x	x	x	x	02/2005

SLES9 support *		
General support	Extended support	Self support
07/30/2009	07/30/2011	07/30/2014

RHEL4 support *		
Full support	Development support	Maintenance support
08/31/2007	02/29/2008	02/29/2012

\* Support dates may be changed by Linux distributors

For latest information and details contact your Linux distributor

SLES = SUSE Linux Enterprise Server  
RHEL = Red Hat Enterprise Linux

# Linux on System z9

## Take control control of your IT infrastructure

- **Enhanced infrastructure simplification capabilities**
  - ▶ Replace your SNA-Network Controllers with Linux on System z
    - CDLC-Support for Communication Controller for Linux on System z V1.2 exploitation
  - ▶ Enhanced Virtualization of Storage Resources
    - Linux supports the zFCP N\_Port ID Virtualization
  - ▶ Exploit your Linux investment with z/VM
    - 2 GB constraints for I/O are resolved with z/VM 5.2
- **Additional secure crypto algorithms support**
  - ▶ Support for Cryptography co-processor
    - Linux exploitation of cryptographic hardware in user-space for application support
- **Get price/performance benefit from the more powerful IFLs on System z9**
  - ▶ More virtual servers *or* more users *or* more throughput for same IFL price

# Linux on IBM System z9

- **Unify the infrastructure**

- ▶ IT optimization and server consolidation based on virtualization technology and Linux
- ▶ Linux can help to simplify systems management with today's heterogeneous IT environment

- **Leverage the mainframe data serving strengths**

- ▶ New solution deployed in less time, accessing core data on DB2 on z/OS
- ▶ Reduced networking complexity and improved security network “inside the box”

- **A secure and flexible business environment**

- ▶ Linux open standards support for easier application integration
- ▶ Virtual growth instead of physical expansion on Intel or RISC servers

- **Leverage strengths across the infrastructure**

- ▶ Superior performance, simplified management, security rich environment
- ▶ Backup and restore processes, Parallel Sysplex and GDPS for Disaster Recovery

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# z9 BC Model R07



- **Machine Type**
  - ▶ 2096
- **Model**
  - ▶ R07
- **Processor Units (PUs)**
  - ▶ 8 PUs per System
  - ▶ 1 SAP per book, standard
  - ▶ No dedicated spares
  - ▶ 7 PUs available for characterization
    - 1 to 3 Central Processors (CPs)
    - Integrated Facility for Linux (IFLs), Internal Coupling Facility (ICFs), System z Application Assist Processors (zAAPs), System z9 Integrated Information Processors (zIIPs), optional System Assist Processors (SAPs)
  - ▶ Up to 15 LPARs
- **Memory**
  - ▶ Minimum of 8 GB
  - ▶ Up to 64 GB per System
    - 8 GB increments
- **I/O**
  - ▶ Up to 16 STIs per System @ 2.7 GB/s each
  - ▶ Total system I/O bandwidth capability of 43.2 GB
  - ▶ Up to 2 Logical Channel Subsystem (LCSS)
  - ▶ Up to a maximum of 4 I/O Domains
    - Up to 240 channels – dependent on Channel types

# z9 BC Model S07



- **Machine Type**
  - ▶ 2097
- **Model**
  - ▶ S07
- **Processor Units (PUs)**
  - ▶ 8 PUs per System
  - ▶ 1 SAP per book, standard
  - ▶ No dedicated spares
  - ▶ 7 PUs available for characterization
    - 0 to 4 Central Processors (CPs)
    - Integrated Facility for Linux (IFLs), Internal Coupling Facility (ICFs), System z Application Assist Processors (zAAPs), System z9 Integrated Information Processor (zIIP), optional System Assist Processors (SAPs)
    - Can have an IFL-only System
  - ▶ Up to 30 LPARs
- **Memory**
  - ▶ Minimum of 8 GB
  - ▶ Up to 64 GB per System
    - 8 GB increments
- **I/O**
  - ▶ Up to 16 STIs per System @ 2.7 GB/s each
  - ▶ Total system I/O bandwidth capability of 43.2 GB
  - ▶ Up to 2 Logical Channel Subsystems (LCSSs)
  - ▶ Up to a maximum of 7 I/O Domains
    - Up to 420 channels – dependent on Channel types

# z9 BC – Under the covers

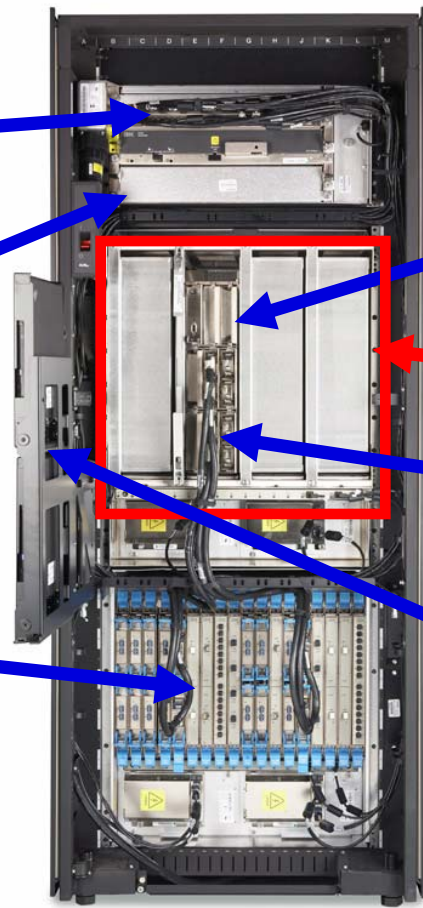
A Frame

Internal Batteries (optional)

Power Supplies

I/O Cage

Fiber Quick Connect Feature (optional)



Front View

Single Processor Book and Memory

CEC Cage

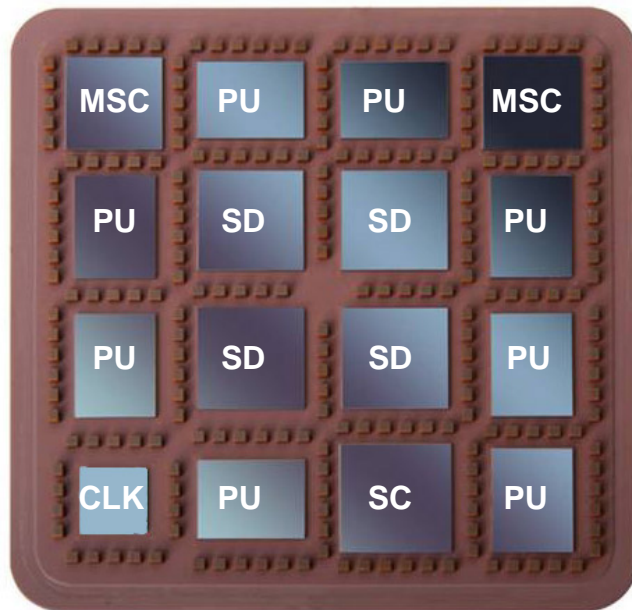
STI Connectors

Support Elements (gate with Laptops swung open)

## z9 BC 8-way MCM

- **Advanced 95mm x 95mm MCM**

- ▶ 102 Glass Ceramic layers
- ▶ 16 chip sites, 217 capacitors
- ▶ 0.545 km of internal wire

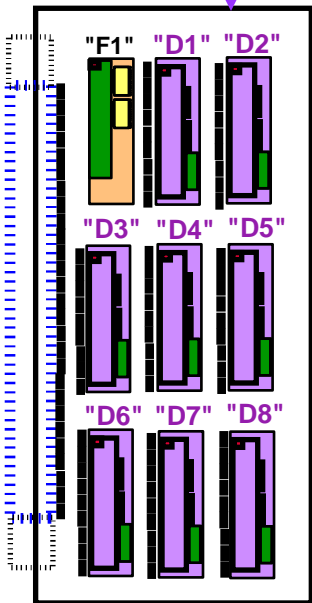


- **CMOS 10Ks0 chip Technology**

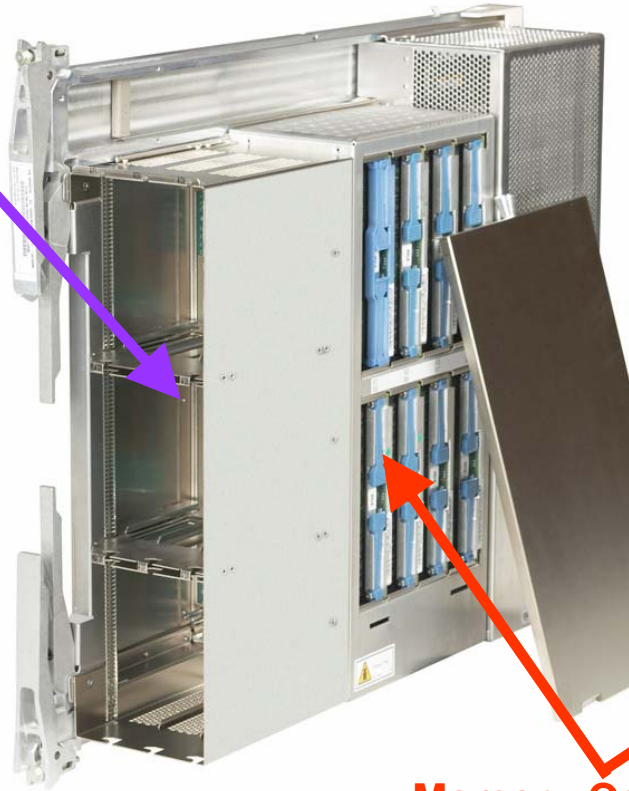
- ▶ PU, SC, SD and MSC chips
- ▶ Copper interconnections, 10 copper layers
- ▶ 8 PU chips/MCM
  - 15.78 mm x 11.84 mm
  - 121 million transistors/chip
  - L1 cache/PU
    - 256 KB I-cache
    - 256 KB D-cache
  - 0.7 ns Cycle Time
- ▶ 4 System Data (SD) cache chips/MCM
  - 15.66 mm x 15.40mm
  - L2 cache per Book
    - 660 million transistors/chip
    - 40 MB
- ▶ One Storage Control (SC) chip
  - 16.41mm x 16.41mm
  - 162 million transistors
  - L2 cache crosspoint switch
  - L2 access rings to/from other MCMs
- ▶ Two Memory Storage Control (MSC) chips
  - 14.31 mm x 14.31 mm
  - 24 million transistors/chip
  - Memory cards (L3) interface to L2
  - L2 access to/from MBAs (off MCM)
- ▶ One Clock (CLK) chip - CMOS 8S
  - Clock and ETR Receiver

# z9 BC Processor Book Layout

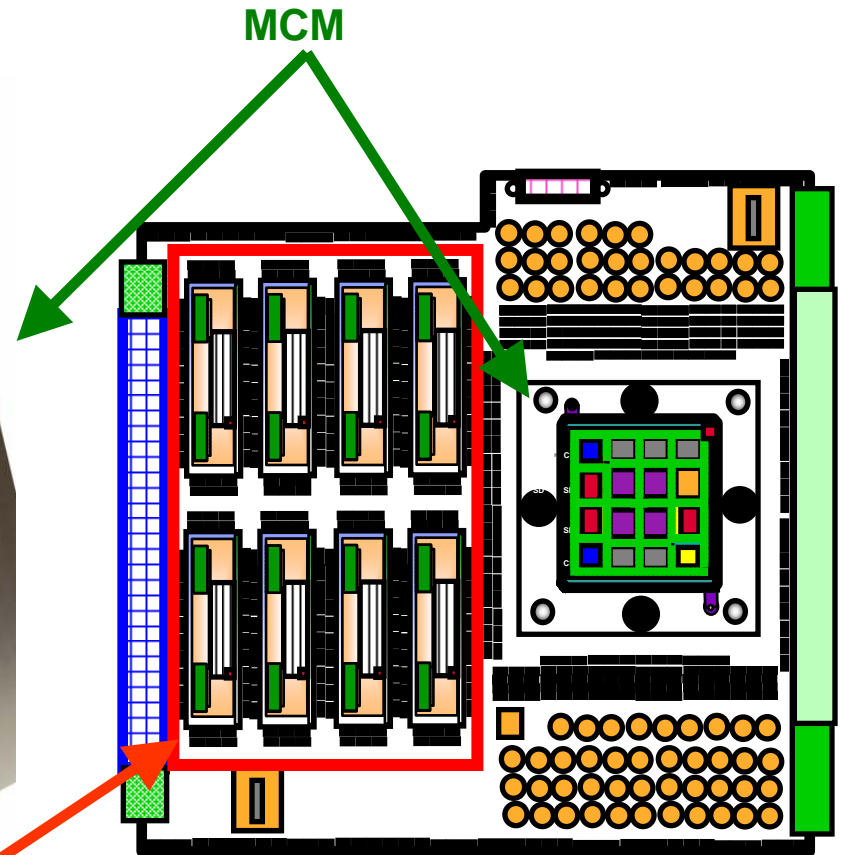
Up to 8  
Hot pluggable MBA/STI  
fanout cards



Front View



Memory Cards  
Up to 64 GB

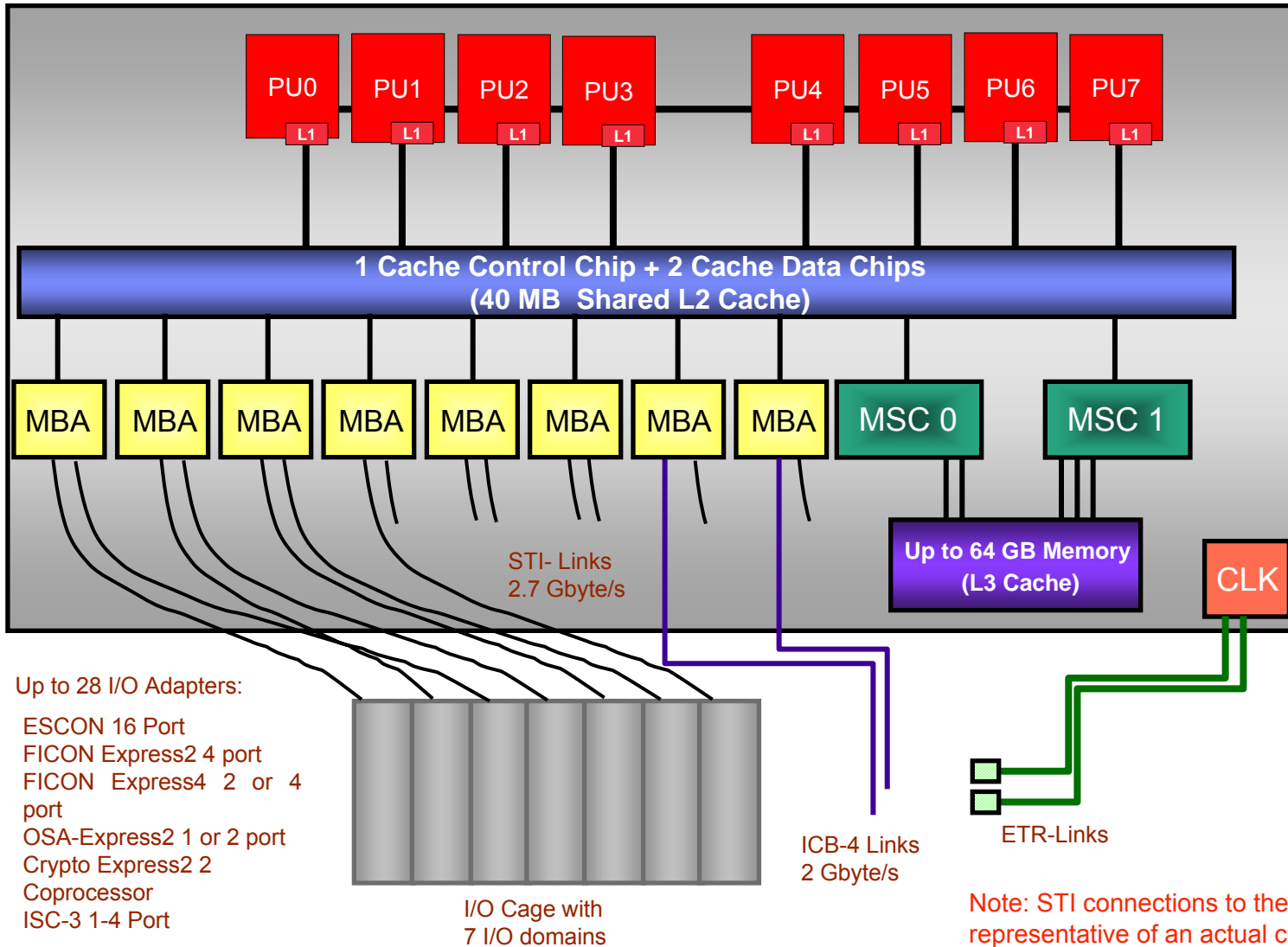


Side View

- Note:**
1. Concept Illustration only - not to scale
  2. 4 or 8 pluggable Memory Cards
  3. Each MBA fanout card is hot-pluggable and has 2 STIs



# z9 BC 8 PU Logical Structure

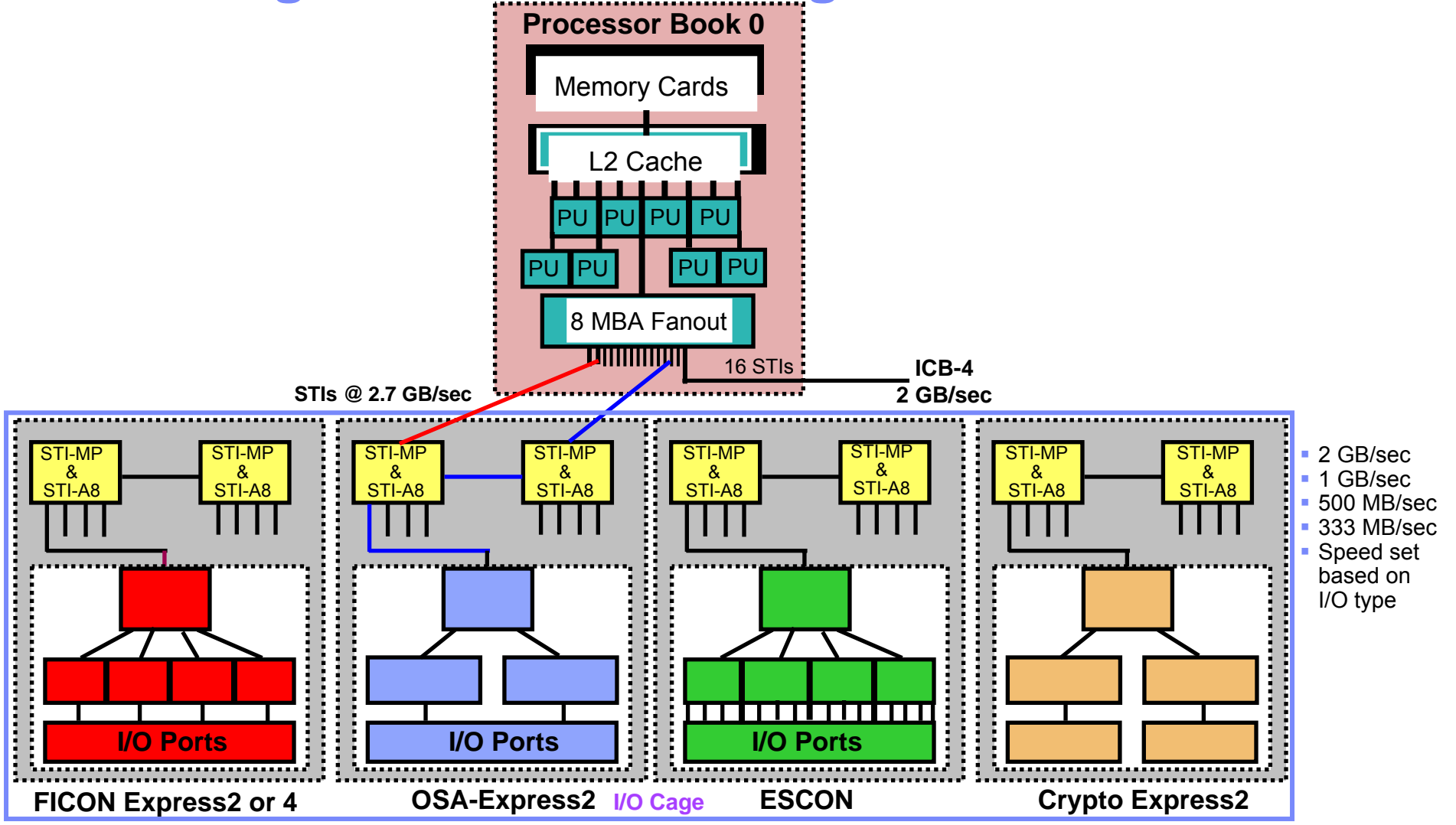


- PU 4 always is SAP, each PU is single core and Crypto Assist
- L2 contains Storage Controller and Storage Data Chips
- Book Package contains PU, Storage Controllers, L2 and L3 Caches, 2.7 GB/sec Self-Timed Interfaces
- Seven of 16 STIs can attach to the I/O cage. Rest can be used for ICB-4s

Up to 28 I/O Adapters:  
 ESCON 16 Port  
 FICON Express2 4 port  
 FICON Express4 2 or 4 port  
 OSA-Express2 1 or 2 port  
 Crypto Express2 2  
 Coprocessor  
 ISC-3 1-4 Port

Note: STI connections to the I/O cage are NOT representative of an actual configuration.

# z9 BC Logical Channel Configuration



**Note:**  
 Each MBA Fanout card has 2 STI ports.  
 MBA supports 2 GB/sec for ICB3 and ICB-4 and 2.7 GB/sec for I/O channels. ICB-3 actually run at 1GB/sec

## z9 BC Memory Upgrade Options

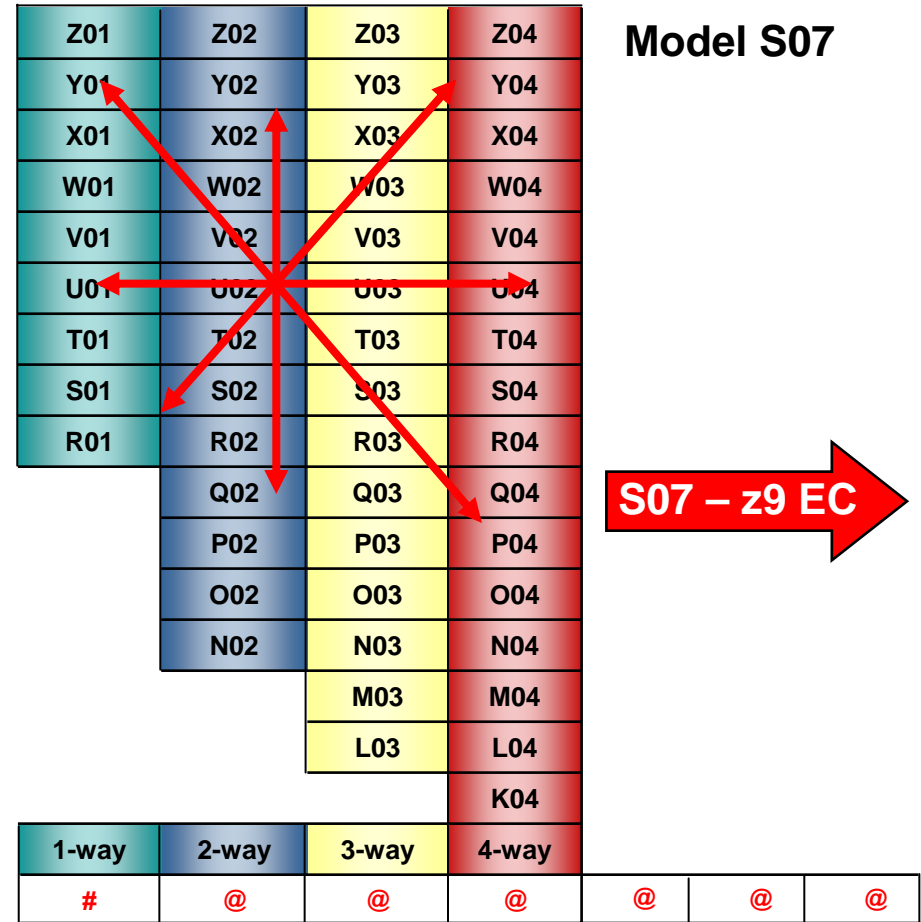
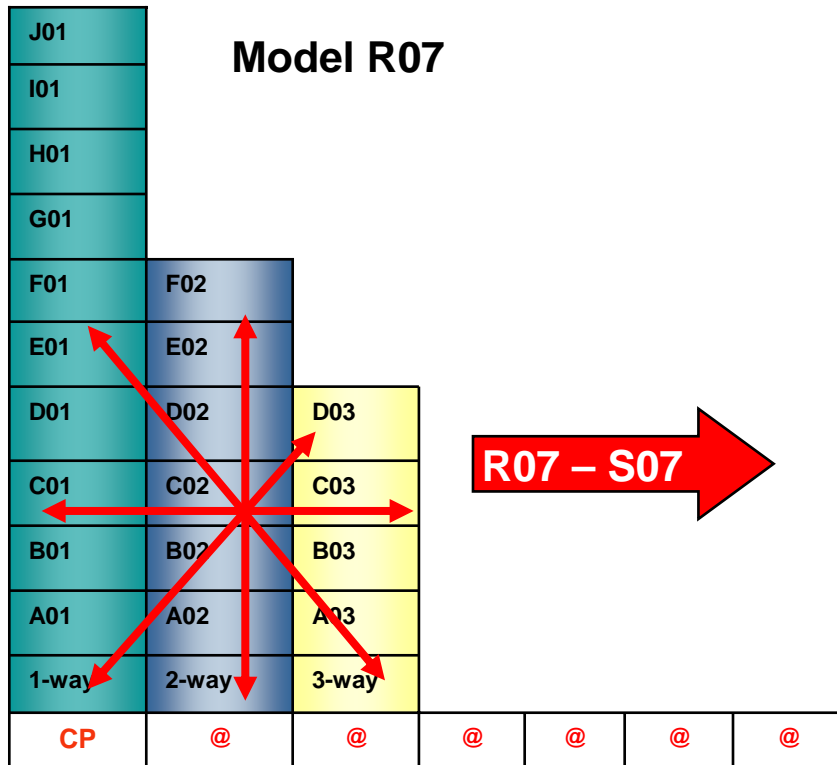
From	To	To	To	To	To	To	To
8 GB	16 GB	24 GB	32 GB	40 GB	48 GB	56 GB	64 GB
16 GB	-	24 GB	32 GB	40 GB	48 GB	56 GB	64 GB
24 GB	-	-	32 GB	40 GB	48 GB	56 GB	64 GB
32 GB	-	-	-	40 GB	48 GB	56 GB	64 GB
40 GB	-	-	-	-	48 GB	56 GB	64 GB
48 GB	-	-	-	-	-	56 GB	64 GB
56 GB	-	-	-	-	-	-	64 GB
64 GB	-	-	-	-	-	-	-

**Red** - Disruptive upgrade

**Green** - Concurrent upgrade

Card Sizes = 2 GB, 4 GB and 8 GB

# z9 BC Improved granularity and scalability



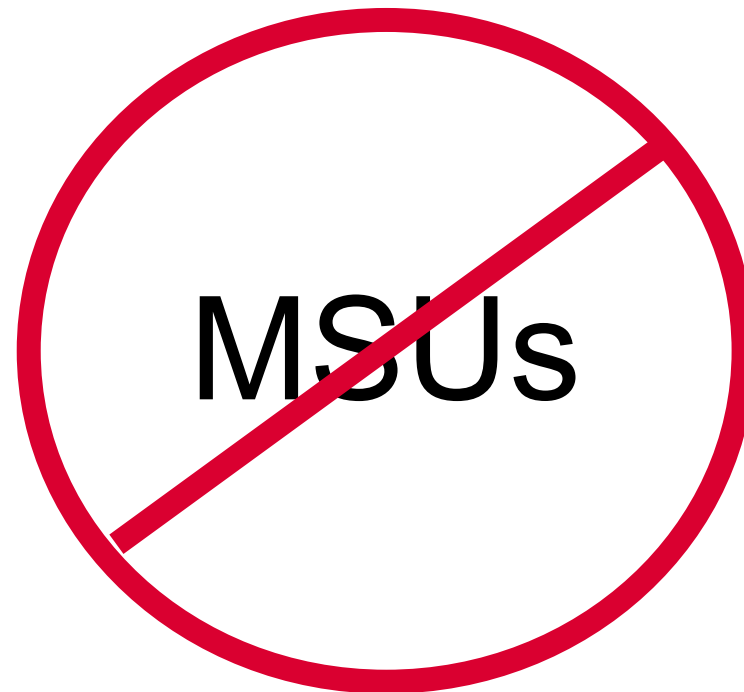
## Full on demand upgradeability in the family

- ▶ Model R07 must have minimum 1 CP engine
- ▶ Model S07 may be a full IFL or ICF system
- ▶ Model R07 upgradeable to Model S07
- ▶ Model S07 upgradeable to z9 EC Model S08

# = CP or IFL or ICF


@ = Any Specialty Engines. zAAPs and zIIPs have T & Cs

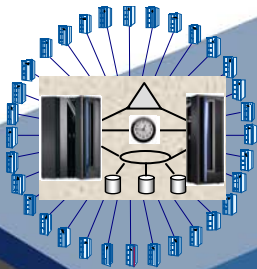
## System z9 Capacity Planning in a nutshell



**Don't use "one number" capacity comparisons!**  
Work with IBM technical support for capacity planning!  
**Customers can now use zPCR**

# Technology evolution with specialty engines

- 
 Building on a strong track record of technology innovation with specialty engines, IBM introduces the System z9 Integrated Information Processor



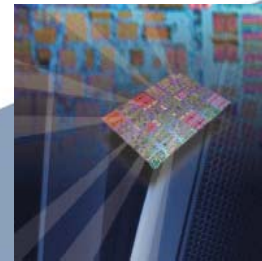
**Internal Coupling Facility (ICF) 1997**

Centralized data sharing across mainframes



**Integrated Facility for Linux (IFL) 2001**

Support for new workloads and open standards



**IBM System z Application Assist Processor (zAAP) 2004**

Designed to help improve resource optimization for z/OS Java™ technology-based workloads



**IBM System z9 Integrated Information Processor (zIIP) 2006**

Designed to help improve resource optimization for eligible data workloads within the enterprise

# System z9 Channel Type and Crypto Overview

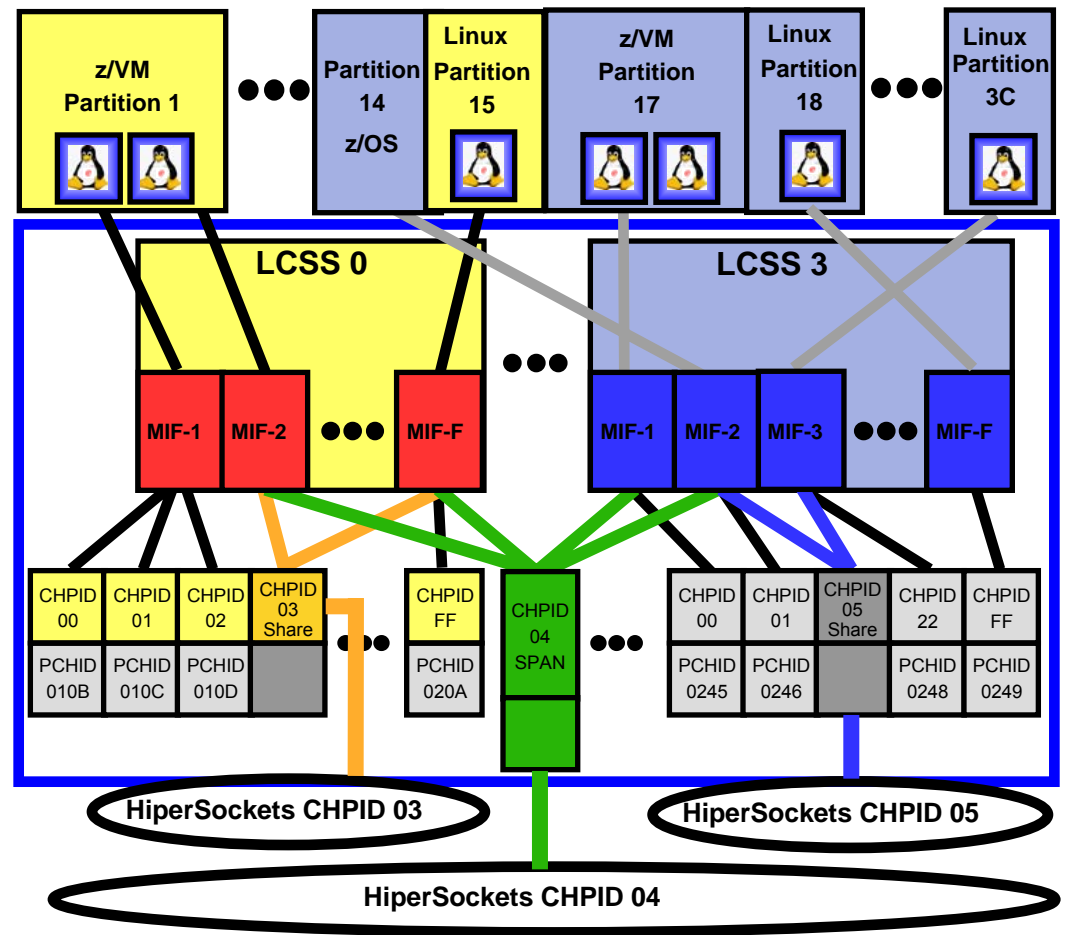
- **FICON/FCP**
  - ▶ FICON Express4
  - ▶ FICON Express2
  - ▶ FICON Express
- **Networking**
  - ▶ OSA-Express2
    - Gigabit Ethernet LX and SX
    - 10 Gigabit Ethernet LR
    - 1000BASE-T Ethernet
  - ▶ OSA-Express (carry forward on upgrade)
    - Gigabit Ethernet LX and SX
    - 1000BASE-T Ethernet
    - Fast Ethernet
  - ▶ HiperSockets
- **Coupling Links**
  - ▶ ISC-3 (Peer mode only)
  - ▶ ICB-3, ICB-4
  - ▶ IC
- **ESCON**
- **Crypto**
  - ▶ Crypto Express2
    - Configurable Coprocessor or Accelerator
- **Channel types not supported:**
  - ▶ FICON (pre-FICON Express)
  - ▶ OSA-Express Token-Ring (SOD Oct 2004)
  - ▶ PCIXCC
  - ▶ PCICA
  - ▶ ICB-2 (SOD 2003)
  - ▶ ISC-3 Links in Compatibility Mode (SOD April 2004)
  - ▶ Parallel (use ESCON Converter)
  - ▶ OSA-Express ATM 155
  - ▶ OSA-2

Note: Only ICB cables orderable.  
All other cables have to be sourced separately.



# System z9 HiperSockets IPv6

- **Internet Protocol Version 6 (IPv6)**
- **More unique IP addresses**
  - ▶ Expands the IP address space
    - From 32 bits to 128 bits
  - ▶ Follow-on to IPv4
- **Minimum software:**
  - ▶ z/OS V1.7
  - ▶ z/VM V5.2 with PTFs in May 2006



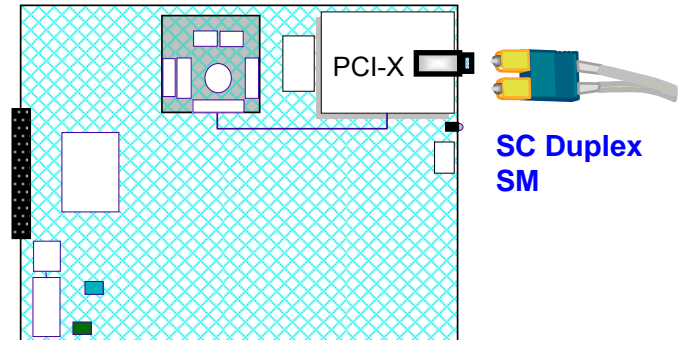
**Very High Speed Interconnection between programs running z/OS, z/VM or Linux**



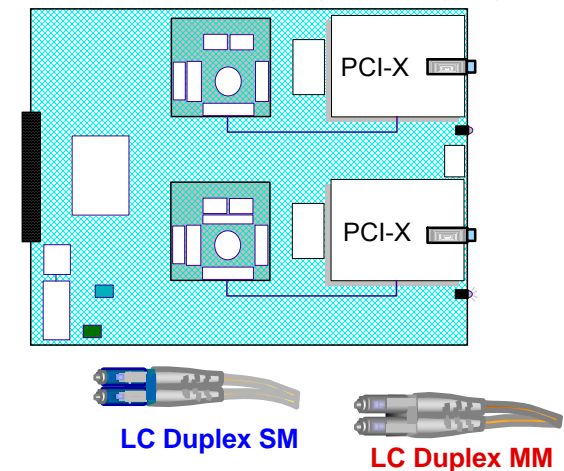
# System z9 OSA-Express2 GbE and 10 GbE

- **10 Gigabit Ethernet LR (long reach)**
  - ▶ One port per feature
  - ▶ CHPID type OSD (QDIO)
  - ▶ 9 micron single mode fiber, SC Duplex connector
- **Gigabit Ethernet features, 2 ports per feature**
  - ▶ CHPID types OSD (QDIO), OSN (OSA for NCP)
  - ▶ Designed to achieve line speed - 1 Gbps in each direction
  - ▶ Gigabit Ethernet LX (Long wavelength)
    - 9 micron single mode fiber, LC Duplex connector
  - ▶ Gigabit Ethernet SX (Short wavelength)
    - 50 or 62.5 micron multimode fiber, LC Duplex connector
- **OSA-Express2 GbE and 10 GbE support**
  - ▶ Large send - offloading TCP segmentation
  - ▶ Concurrent LIC update to minimize network traffic disruption
  - ▶ 640 TCP/IP stacks - improved virtualization
  - ▶ Layer 2 support - protocol-independent packet

10 Gigabit Ethernet  
Feature 3368



Gigabit Ethernet  
Features 3364 (LX), 3365 (SX)

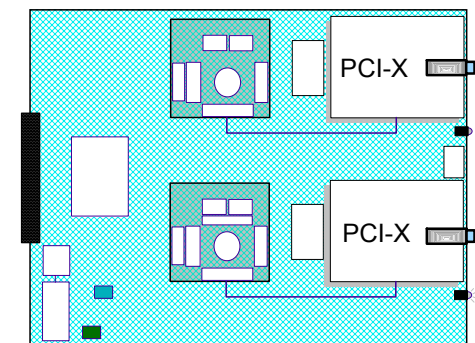


# System z9 OSA-Express2 1000BASE-T Ethernet

- **Planned to be available for z890 during 3Q06**
  - ▶ It is intended that FC 1366 be no longer orderable
  - ▶ Channel type OSN not supported on z890
- **Supports auto-negotiation to 10, 100, 1000 Mbps over Category 5 copper**
- **Capable of achieving line speed**
  - ▶ Actual throughput is dependent upon environment
- **Supports:**
  - ▶ Large send - **offloading TCP segmentation**
  - ▶ Concurrent LIC update to **minimize network traffic disruption**
  - ▶ 640 TCP/IP stacks - **improved virtualization**
  - ▶ Layer 2 support - **protocol-independent packet**

Mode	CHPID	Description
OSA-ICC	OSC	3270 data streams
QDIO	OSD	TCP/IP traffic when Layer 3 Protocol-independent when Layer 2
Non-QDIO	OSE	TCP/IP and/or SNA/APPN® /HPR traffic
OSA NCP	OSN	Channel Data Link Control for Linux NCP

1000BASE-T Ethernet #3366



## OSA-Express2 OSN supporting CCL NCP

- **Designed to help eliminate dependencies on hardware:**
  - ▶ 3745/3746, ESCON, Token-Ring
- **OSA-Express2 (GbE, 1000BASE-T Ethernet)**
  - ▶ New CHPID type – OSN
- **Provides support for IBM Communication Controller for Linux on System z9 (CCL)**
- **Allows TPF to exploit CCL**
- **Designed to preserve mission-critical SNA functions (such as SNI) and z/OS application workloads which depend upon these functions**
- **System z9 operating systems remain unchanged**
- **Helps collapse SNA inside server while exploiting and leveraging IP**

Note: Channel type OSN not supported on z890

## FICON Express4 for System z9

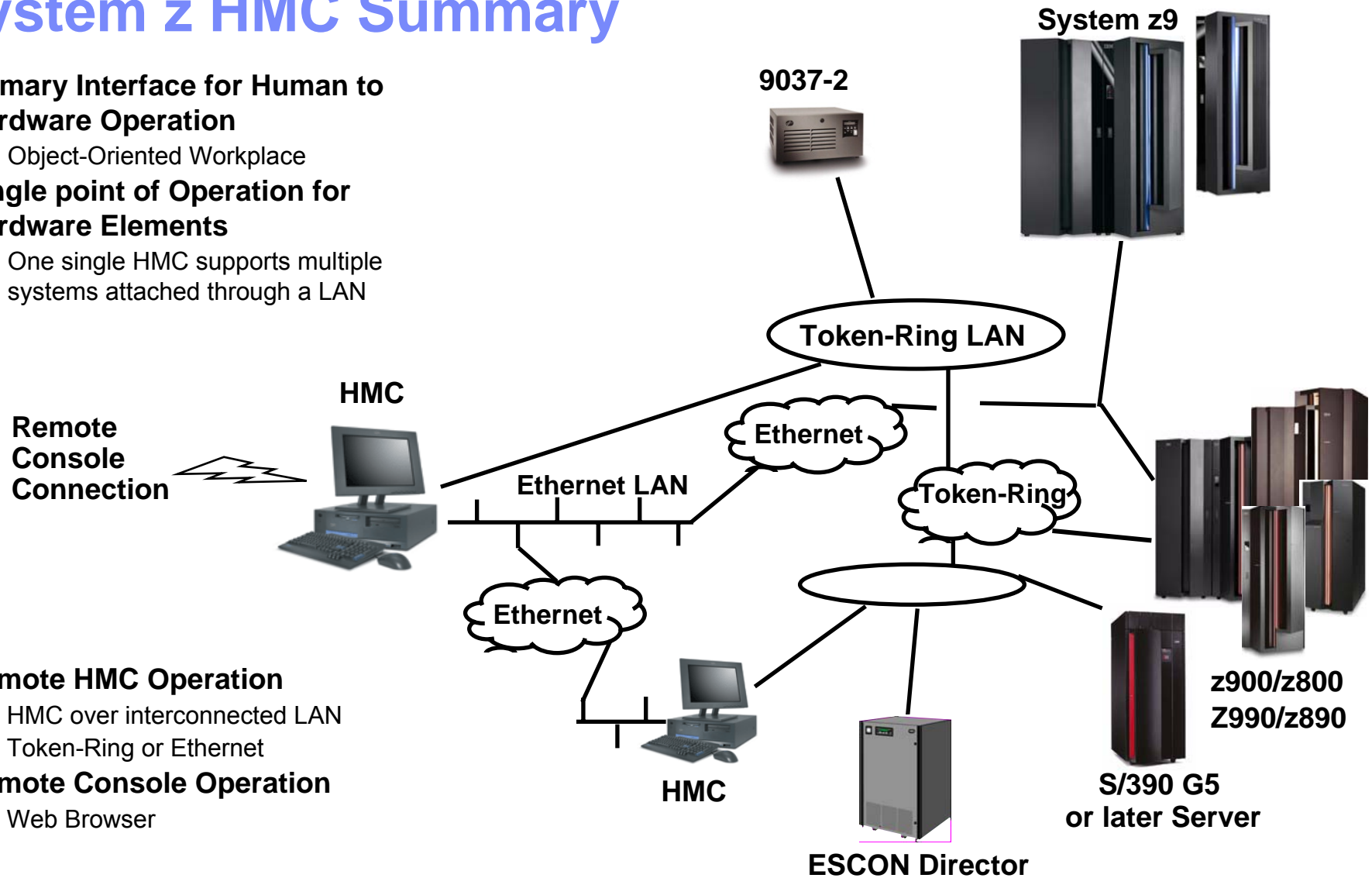
- **Designed to improve capacity and performance with next generation 4 Gbps FICON/FCP**
  - ▶ Up to 25% improvement in FICON channel throughput when processing a mix of read and write data transfers<sup>1</sup>
  - ▶ Up to 65% improvement in FICON channel throughput when processing all read or all write data transfers<sup>1</sup>
  - ▶ 220% cumulative MB/sec throughput improvement in DB2 table scan tests for EF datasets with FICON Express4 on z9 EC with the MIDAW facility compared to FICON Express2 without the MIDAW facility on z9 EC<sup>2</sup>
- **Helps to support reduced cost of storage operations and shorter backup windows with faster channel link data rates**
- **Enables migration to higher performance with 1/2/4 Gbps auto-negotiating links**
- **2-port/4-port cards for z9 BC and 4-port for z9 EC**

1. Large sequential data transfers on z9 EC with FICON Express4 operating at 4 Gbps when compared to FICON Express2 on z9 EC

2. Results of internal DB2 table scan tests with the z9 EC, the MIDAW facility, FICON Express4 operating at 4 Gbps, and the DS8000 compared to z9 EC, and FICON Express2 operating at 2 Gbps

# System z HMC Summary

- **Primary Interface for Human to Hardware Operation**
  - ▶ Object-Oriented Workplace
- **Single point of Operation for Hardware Elements**
  - ▶ One single HMC supports multiple systems attached through a LAN



- **Remote HMC Operation**
  - ▶ HMC over interconnected LAN
  - ▶ Token-Ring or Ethernet
- **Remote Console Operation**
  - ▶ Web Browser

# System z9 Cryptographic Support Summary

- **CP Assist for Cryptographic Function (CPACF)**

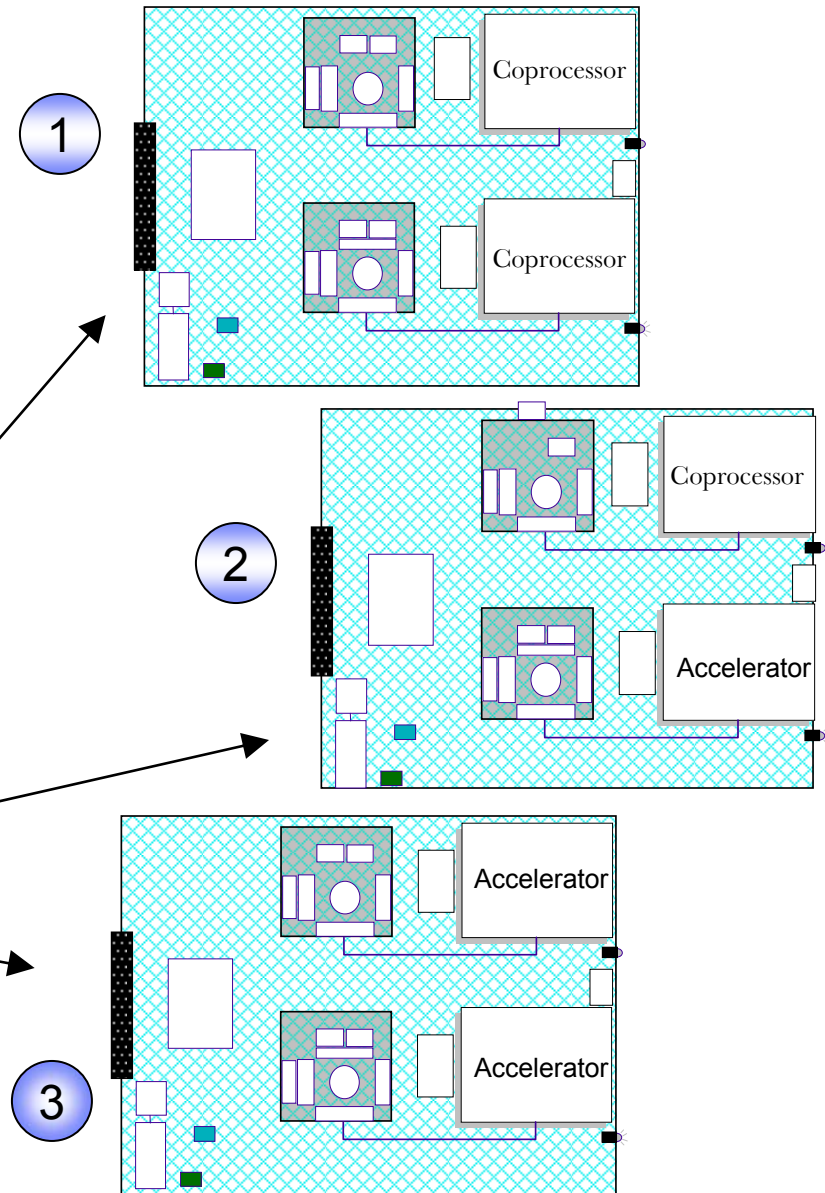
- ▶ Standard on every CP and IFL
- ▶ Supports DES, TDES and SHA-1
- ▶ New to z9 EC
  - Advanced Encryption Standard (AES)
  - Secure Hash Algorithm – 256 (SHA-256)
  - Pseudo Random Number Generation (PRNG)

- **Crypto Express2**

- ▶ Two configuration modes
  - Coprocessor (default)
    - Designed for Federal Information Processing Standard (FIPS) 140-2 Level 4 certification
  - Accelerator (configured from the HMC)
- ▶ Three configuration options
  - Default set to Coprocessor

- **TKE workstation with 5.0 level of LIC**

- ▶ Supports configurable Crypto Express2 feature
- ▶ New Graphical User Interface (GUI)
- ▶ Smart Card Reader



# System z9 Availability and Scalability

## Parallel Sysplex

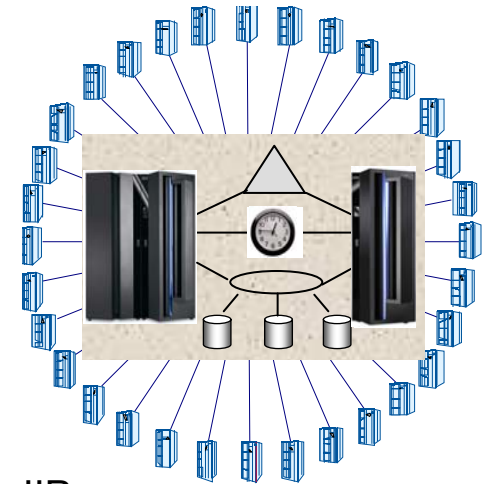
- ▶ Availability / Capacity / Scalability
- ▶ High level of performance
- ▶ Internal or standalone CF
- ▶ System-Managed CF Structure Duplexing
- ▶ Designed for no single point of failure



## Single System

- ▶ Capacity Upgrade on Demand\*
- ▶ Capacity BackUp\* extended to ICF, IFL, zAAP, zIIP
- ▶ Hot Pluggable I/O
- ▶ Pluggable optics for FICON Express4
- ▶ Built in Redundancy
- ▶ Advanced Problem Determination
  - FICON/FCP enhancements
- ▶ Concurrent LIC Updates
- ▶ Enhanced driver maintenance
- ▶ Redundant I/O Interconnect

\*Terms and conditions apply



**1 to 32 Systems**

**System z9 continues to address the requirements for advanced availability and clustering**

# System z9 Concurrent Upgrade – Customer Controlled

- **On/Off Capacity on Demand - Temporary upgrade**
  - ▶ Nondisruptive temporary addition of CPs, IFLs, ICFs zAAPs and zIIPs
  - ▶ "Right to use" feature - Orderable as MES or with new build to initiate contract and administrative setup
  - ▶ Customer orders and installs upgrade via Resource Link and IBM RSF
  - ▶ Nondisruptive removal when capacity is no longer wanted
- **CIU – Customer Initiated Upgrade - Express - Permanent upgrade**
  - ▶ Customer capability to order and install permanent upgrade
  - ▶ Not included
    - Upgrades requiring parts (e.g., memory)
    - Channel upgrades by LIC enable of existing ports
  - ▶ CIU feature - MES ordered to initiate contract and administrative setup
  - ▶ Customer orders and installs upgrade via Resource Link and IBM RSF
- **CBU – Capacity BackUp - Temporary emergency capacity upgrade**
  - ▶ Nondisruptive temporary addition of CPs, IFL, ICF, zAAPs, zIIPs in an emergency situation
  - ▶ CBU contract required to order CBU features and CBU LIC CC
  - ▶ Customer activates upgrade for test or temporary emergency
  - ▶ Nondisruptive downgrade after test or recovery completed

Note: Upgrades are nondisruptive only where there is sufficient hardware resource available and provided pre-planning has been done



## System z9 HMC Security aspects

- **Remote support connections for service are initiated by the customer machine (HMC) to IBM Retain. With customer consent, IBM may connect to the system**
- **An RSF connection can be made via a phone connection or an Internet connection.**
  - ▶ If it is via a phone connection, the protocol used is PPP and TCPIP. Data transfer is done using SSL encryption.
    - Phone connections are made using ATT as the global service provider.
    - Provision is made for the use of local phone connections where available.
    - ATT system is designed to limit access for these connections to a restricted set of destination IP addresses. ATT system is designed so that general Internet access is not available through these connections.
  - ▶ If it is via an Internet connection, the protocol used is TCPIP and data transfer is done using SSL encryption.
  - ▶ Internet connections are assumed to go through a customer firewall system before entering the global Internet.
- **On either style connection, the IBM Retain system is designed to validate that the incoming requesting system is known and authorized**

## z9 BC Physical planning

- **IMPP - GC28-6855**
- **All systems are 1 frame systems**
  - ▶ Only raised floor systems at GA
- **Height reduction (FC 9975)**
  - ▶ Accommodates door height restrictions
  - ▶ IBF batteries will come unplugged if height reduction is ordered
- **Air Cooled – No MRU**
- **Internal Battery Feature - IBF (FC 3210)**
  - ▶ Installed in pairs (top - front and back - one pair only)
  - ▶ No width reductions are required
  - ▶ Can be added later via MES
- **Power – Dual power cables - 3 phase or optional 1 phase**
  - ▶ 30Amp, 250V or 450V, Hubbell
  - ▶ Upper CEC cage - back side
- **Power Sequence Control (PSC) - Optional FC 6501 installed as a pair**



# Restriction of Hazardous Substances (RoHS) – Overview

- **What is RoHS**
  - ▶ European Union Restriction of Hazardous Substance Directive
  - ▶ Ban placing new electrical and electronic equipment (EEE) containing more than agreed levels of lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyl (PBB) and polybrominated diphenyl ether (PBDE) flame retardants on the EU market beginning July 1, 2006
- **Most IT hardware is included within the scope: PCs, servers, storage, printers, options**
- **Products and their components must comply**
- **Impacts all products/equipment put on the market (sold) in the effected countries beginning July 1, 2006 – not just the launch of a new product or product line**
- **Spares/FRUs for non-compliant equipment put (sold) on the market prior to July 1, 2006 are exempt from the legislation**

# Restriction of Hazardous Substances (RoHS) – Countries

- **Countries that plan to implement legislation on July 1, 2006**
  - ▶ EU Member States
    - Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Netherlands, and United Kingdom
  - ▶ Others
    - Switzerland and Norway
- **China plans to adopt this legislation or very similar legislation, date is not firm at this point. Other countries/states are looking at it**
- **For further info: [www.ibm.com/ibm/environment/products/rohs.shtml](http://www.ibm.com/ibm/environment/products/rohs.shtml)**

# Server Time Protocol (STP) Overview

- **Designed to provide capability for multiple System z platforms to maintain time synchronization with each other**
  - ▶ Does not require the 9037 Sysplex Timer if all servers STP capable
- **Timing information transmitted over ISC-3 links (Peer mode), ICB-3 and ICB-4 links**
- **Supports a multi-site timing network of up to 100 km (62 miles)**
  - ▶ Allows a Parallel Sysplex cluster to span up to 100 km
- **May reduce the cross-site connectivity required for a multi-site Parallel Sysplex clusters**
- **Can coexist with an External Time Reference (ETR) network (9037 based)**
  - ▶ Mixed Timing Network
- **Designed to allow use of dial-out time services to set the time to international time standard (UTC) as well as adjust to UTC**
- **Planned to be available as a feature on System z9 and as a RPQ on z990 and z890**
- **Prerequisites**
  - ▶ z9 EC HMC and SE Code load
  - ▶ z/OS V1.7

All statements regarding IBM future direction and intent are subject to change or withdrawal without notice, and represents goals and objectives only.

# System z9 CFCC Level 14

- **Function and Potential Benefit**

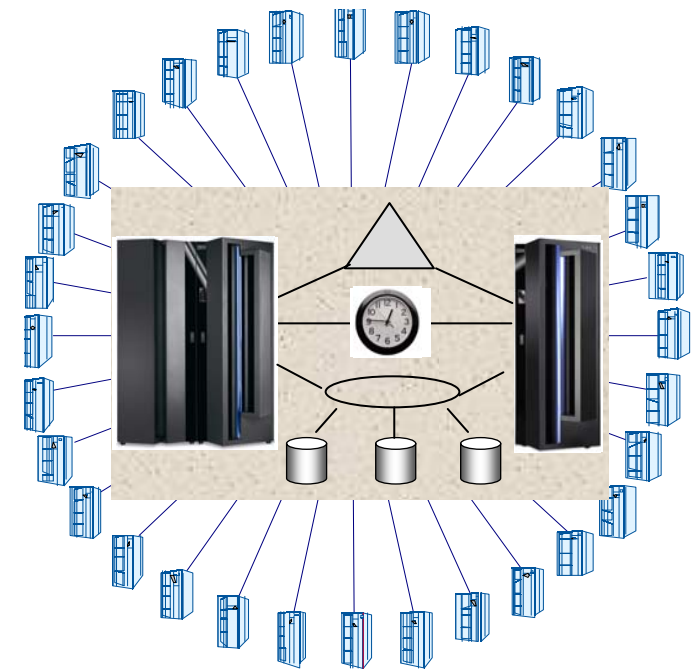
- ▶ Contains improvements to the CF dispatcher and internal serialization mechanisms designed to better manage coupled workloads

- **Requirements and Support**

- ▶ z/OS 1.4 and higher
  - Optional APAR fix OA08742 to allow sysplex connectors to request structure allocation in a Level 14 Coupling Facility
- ▶ z/VM 4.4 and higher for virtual CF support

- **CF Storage Sizing with CFCC level 14**

- ▶ May increase storage requirements
- ▶ Use CFSIZER tool to determine:  
[www.ibm.com/servers/eserver/zseries/cfsizer/](http://www.ibm.com/servers/eserver/zseries/cfsizer/)



**1 to 32 Systems**

*IBM system z is designed to meet the requirements for advanced clustering*

# System z Fiber Optic Coupling Links

## ■ InterSystem Channel-3

- ▶ 3rd generation Coupling Link
- ▶ ISC-3 links ordered in increments of one
- ▶ Activated links balanced across features

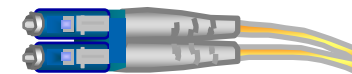
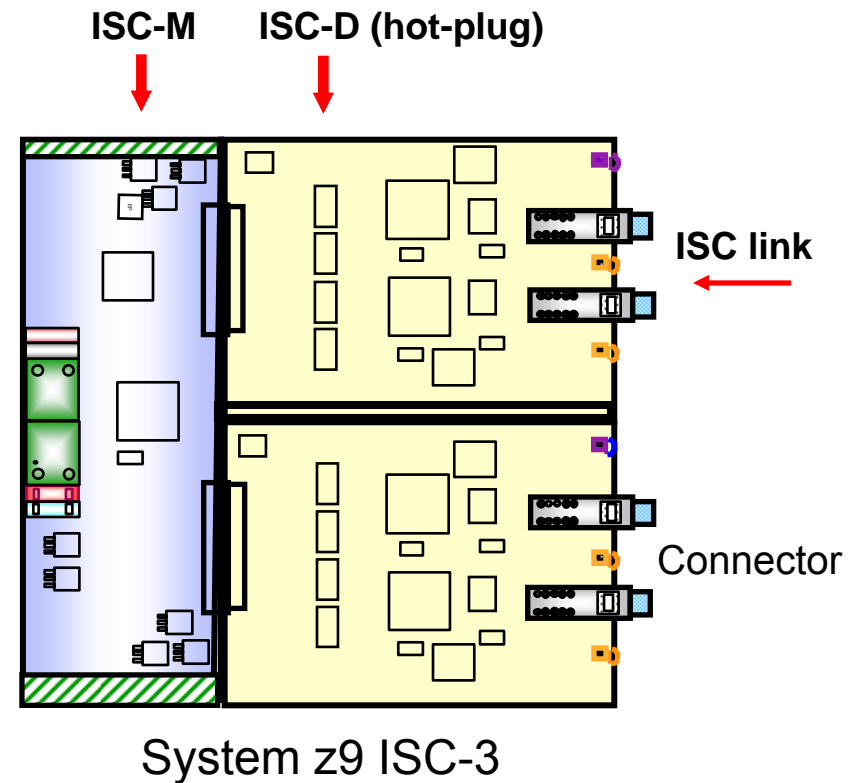
## ■ Peer mode only

- ▶ Peer Mode (2 Gigabits per second - Gbps)
- ▶ Connects to zSeries only
- ▶ No connectivity to any 9672 or 9674

## ■ ISC-3 FCs: 0217(ISC-M), 0218 (ISC-D / ISC link)

- ▶ Activate link - FC 0219
- ▶ Four ports per ISC-M (two ports per ISC-D)
- ▶ Supports 9 micron single mode fiber

## ■ Up to 48 links



LC Duplex SM

# Linux is Linux (right?)

- **Yes and No**
  - Yes, inasmuch as driving a Porsche on I-5 is the same as driving the same Porsche on a German Autobahn!
  - IBM guarantees that you can drive Linux on
    - xSeries (Intel),
    - pSeries (Unix), or
    - zSeries (Mainframe) processors,...but how *fast* your workload performs depends on many factors!
- **Common Considerations**
  - ISV support
  - Application compatibility with each platform
  - I/O throughput
  - Ease of migration (if applicable)
  - Existing infrastructure components
  - Special features offered by each IBM platform



# End of Presentation